

Claims

1. A method of assigning objects to processing units of a cluster of processing units, each one of the processing units having a storage capacity, the method comprising the steps of:
 - a) sorting of the objects by size to provide a sequence of objects;
 - b) for each processing unit of the cluster:
 - assigning of one or more of the objects to the processing unit starting with the largest object in the sequence until a remaining storage capacity of the processing unit is below the smallest object of the sequence;
 - deleting of the objects which are assigned to a processing unit from the sequence.
2. The method of claim 1, whereby step 1 b) is carried out repeatedly until the sequence is empty which provides a minimum number of the processing units.
3. The method of claim 1 or 2, whereby the remaining storage capacity is determined by the difference between the storage capacity and the aggregated size of objects being assigned to the processing unit.
4. The method of claim 3, further comprising the steps of:
 - c) determining a largest gap between the aggregated size of objects being assigned to one of the processing units and the storage capacity,
 - d) subtracting the gap divided by the minimum number of processing units from the storage capacity to provide a first threshold,
 - e) performing step 1 b) again, whereby the remaining storage capacity is the difference between the aggregated size of the objects being assigned to the processing units and the first threshold.

5. The method of any one of the preceding claims 1 to 4, further comprising the steps of:
 - c) determining the total of the sizes of the objects,
 - d) determining the difference between the total of the storage capacities of the minimum number of processing units and the total of the sizes of the objects,
 - e) subtracting the difference divided by the minimum number of processing units from the storage capacity to provide a second threshold,
 - f) performing step 1b) again, whereby the remaining storage capacity is determined by the difference between the aggregated size of the objects being assigned to the processing unit and the second threshold,
 - g) in case that as a result of step 5f) there is an excess amount of memory requirement for one of the processing units which surpasses the storage capacity, dividing the excess amount by the minimum number of processing units and increasing the second threshold by the result of the division,
whereby steps 5 f) and 5 g) are performed repeatedly until there is no such excess amount.
6. The method of claim 5, whereby if there is no such excess amount but a gap, dividing the gap by the minimum number of processing units and decreasing the second threshold by the result of the division.
7. The method of any one of the proceeding claims 1 to 6, further comprising the steps of:
 - c) stepwise varying a third threshold between first and second limits,

- d) performing step 1 b) for each third threshold value, whereby the remaining storage capacity is the difference between the aggregated size of the objects being assigned to the processing unit and the third threshold, and whereby a statistical measure is calculated for the assignment of objects to the processing unit,
- e) selecting of one of the assignments of objects to processing units based on the statistical measure.

8. The method of claim 7, whereby the first limit is the aggregated size of the objects divided by the minimum number of processing units, and whereby the second limit is the storage capacity.

9. The method of claims 7 or 8, whereby the statistical measure calculated by calculating the standard deviation or the variance of the totals of the sizes of objects assigned to one processing unit.

10. The method of any one of the proceeding claims 1 to 9, whereby the objects are database tables of various sizes.

11. The method of any one of the preceding claims 1 to 10, whereby each one of the processing units is a blade or a blade server.

12. A computer program product for assigning objects to processing units of a cluster of processing units, each one of the processing units having a storage capacity, the computer program product comprising program means for performing the steps of:

- a) sorting of the objects by size to provide a sequence of objects;
- b) for each processing unit of the cluster:
 - assigning of one ore more of the objects to the processing unit starting with the largest object in the sequence until a remaining storage capacity of the processing unit is below the smallest object of the sequence;

- deleting of the objects which are assigned to a processing unit from the sequence.

13. The computer program product of claim 12, the program means being adapted to repeatedly carry out step 12 b) until the sequence is empty and to output a minimum number of the processing units, which are required for the objects.

14. The computer program product of claims 12 or 13, whereby the remaining storage capacity is determined by the difference between the storage capacity and the aggregated size of objects being assigned to the processing unit.

15. The computer program product of claims 12, 13 or 14, the program means being adapted to perform the steps of :

- c) determining a largest gap between the aggregated size of objects being assigned to one of the processing units and the storage capacity,
- d) subtracting the gap divided by the minimum number of processing units from the storage capacity to provide a first threshold,
- e) performing step 12 b) again, whereby the remaining storage capacity is the difference between the aggregated size of the objects being assigned to the processing units and the first threshold.

16. The computer program product of anyone of the proceeding claims 12 to 15, the program means being adapted to perform the steps of:

- c) determining the total of the sizes of the objects,
- d) determining the difference between the total of the storage capacities of the minimum number of processing units and the total of the sizes of the objects,
- e) subtracting the difference divided by the minimum number of processing units from the storage capacity to provide a second threshold,

- f) performing step 12b) again, whereby the remaining storage capacity is determined by the difference between the aggregated size of the objects being assigned to the processing unit and the second threshold,
- g) in case that as a result of step 16f) there is an excess amount of memory requirement for one of the processing units which surpasses the storage capacity, dividing the excess amount by the minimum number of processing units and increasing the second threshold by the result of the division,

whereby steps 16 f) and 16 g) are performed repeatedly until there is no such excess amount.

17. The computer program product of anyone of the proceeding claims 12 to 16, the program means being adapted to perform the steps of:
 - c) stepwise varying a third threshold between first and second limits,
 - d) performing step 12 b) for each third threshold value, whereby the remaining storage capacity is the difference between the aggregated size of the objects being assigned to the processing unit and the third threshold, and whereby a statistical measure is calculated for the assignment of objects to the processing unit,
 - e) selecting of one of the assignments of objects to processing units based on the statistical measure.
18. A data processing system for determining a minimum number of processing units of a cluster of processing units for a given number of objects having various sizes, the data processing system comprising:
 - means (114) for sorting of the objects by size to provide a sequence of objects,

- means (116) for assigning of one or more of the objects to a processing unit starting with the largest object in the sequence until a remaining storage capacity of the processing unit is below the smallest object of the sequence,
- means (122, 126) for outputting of the minimum number of the processing units.

19. The data processing system of claim 18, each processing unit being a single-board computer having a bus interface to a bus system that couples the single-board computers.
20. A blade server having object size balancing means (110, 112) for assigning objects to a plurality of blade servers, the object size balancing means being adapted to assign objects to the blade servers by the steps of:
 - a) sorting of the objects by size to provide a sequence of objects;
 - b) for each processing unit of the cluster:
 - assigning of one or more of the objects to the processing unit starting with the largest object in the sequence until a remaining storage capacity of the processing unit is below the smallest object of the sequence;
 - deleting of the objects which are assigned to a processing unit from the sequence.